

### **Remarks/Arguments**

The Applicants respectfully request further examination and reconsideration in view of the above amendments and arguments set forth fully below. Claims 1, 8-27, 29-33, 35-130, and 132 were pending. Claims 9, 11, 15, 18, 20-27, 33, 35-37, 39, 42, 43, 45-127 are withdrawn from consideration. By the above amendments, Claims 1, 129, and 132 are amended. Accordingly, Claims 1, 8-27, 29-33, 35-130, and 132 are currently pending.

### **Claim Rejections Under 35 U.S.C. §112**

Within the Office Action, Claims 1, 8, 10, 12-14, 16, 17, 19, 29-32, 38, 40, 41, 44, 128-130, and 132 are rejected under 35 U.S.C. §112, second paragraph. Specifically, it states in the Office Action that the term “set” cannot be used to refer to a set comprise only one finger.

The applicants respectfully disagree. The applicants respectfully submit that “a set of one or more fingers” can refer to both “one finger” and “more than one fingers.” To further the prosecution, the independent Claim 1 has been amended to no longer contain the term “set” of one or more fingers, so currently the Claim 1 recites a first (second) of one or more fingers. Accordingly, the first of one or more fingers can be 118A (the first 118A that branches out from the inlet channel), which points at a direction parallel to x-axis. [Present application, Figures 3B and 21] The second of one or more fingers can be 118B and 118C, which point at a direction parallel to y-axis.

By above amendments, the term “set” is no longer included in the Claims 1, 129, and 132.

Within the Office Action, it is stated that it is unclear how at least a portion of one of the first set of one or more fingers is **nonparallel** to a portion of at least a portion of one of the second set of the one or more fingers.

The independent Claim 1 has been amended to recite “wherein at least a portion of one of the first of the one or more fingers is nonparallel to a portion of at least one of the second of the one or more fingers.” As described above, 118A (first branched channel from inlet 108) can be the first of the one or more fingers and 118B with 118C can be the second of the one or more fingers. [Present application, Figures 3B and 21] Since 118 A (pointing to axis x) is **non-parallel** to 118B and 118C (pointing to axis y), the claim elements are clear.

Further, it is stated in the Office Action that “‘fingers’ in claim 129 does not specify which of the ‘fingers’ (i.e. those of the first set or those of the second set) applicant is referring to. This renders the claim 129 ambiguous.”

By above amendment, Claim 129 has been amended to recite that “wherein the first one or more fingers, the second one or more fingers, or both comprises a plurality of apertures positioned above the plurality of conduits to deliver the fluid to the heat exchanging layer.”

Accordingly, the claim elements of claim 129 are currently clear.

Furthermore, it is stated in the Office Action that “the recitation in claim 132 that at least one inlet port, inlet channel and the first set, the second set, or both sets of fingers are ‘substantially in a plane’ appears to be mis-descriptive. All of these structures are three dimensional and hence, by definition cannot be ‘substantially in a plane.’ The term ‘substantially in a plane’ in claim 132 is a relative term which renders the claim indefinite.”

It is disclosed in the present specification that

[a]s shown in Figure 3A, the fluid enters manifold layer 106 via the inlet port 108 and flows along the inlet channel 116 to several fingers 118 which branch out from the channel 116 in several directions in the X and/or Y directions to apply fluid to selected regions in the interface layer 102. The fingers 118 are arranged in different predetermined directions to deliver fluid to the locations in the interface layer 102 corresponding to the areas at or near the hot spots in the heat source. [Present specification, page 14, line 26 to page 15, line 3]

As described above, the first and second one or more fingers are able to be placed in the manifold layer 106. As shown in Figure 3B and 21, the manifold layer 106 can be a **planner structure** containing the inlet port, inlet channel, the first and second one or more fingers. Accordingly, a person who has ordinary skill in the art would appreciate that the inlet port 108, the inlet channel, the first and second fingers 118A, 118B, and 118C can be arranged **substantially in a plane** that is contained in the manifold 106 when comparing with the whole cooling architecture (manifold 106, intermediate layer 104, and interface layer 102) of the presently-claimed invention.

Currently, Claims Claims 1, 8, 10, 12-14, 16, 17, 19, 29-32, 38, 40, 41, 44, 128-130, and 132 comply with the requirements of 35 U.S.C. §112. The applicants respectfully request the rejections to be withdrawn.

**Claim Rejections Under 35 U.S.C. §103**

Within the Office Action, Claims 1, 8, 10, 12-14, 17, 19, 32, 38, 40, 128-130, and 132 are rejected under 35 U.S.C. §103(a) as obvious over the combined teachings of U.S. Patent No. 5,388,635 to Gruber et al (hereinafter Gruber) and U.S. Patent No. 5,761,037 to Anderson et al (hereinafter Anderson). Specifically, Gruber is cited in the Office Action as a teaching of “the at least one **inlet port directs fluid from an inlet channel coupled to the at least one inlet port to a first of one or more fingers, a second of one or more fingers, or both of the first and the second of one or more fingers**, wherein the first of the one or more fingers branch from the inlet channel, wherein the second of the one or more fingers branch from the inlet channel.” The Applicants respectfully disagree.

It is stated in the Office Action that Gruber teaches that “[a] structure 20 defines an inlet port 28 that channels fluid to a first set of one or more fingers (one of channels 30) and a second set of one of more fingers (another of channels 30) that branch out in a plurality of directions from the inlet port and hence nonparallel. The first set of fingers branches from an inlet channel to supply channels 32 (see Figures 3 and 4).” [Office Action, Page 7]

As recognized in the Office Action and shown in Figure 3 of Gruber, Gruber teaches that the first/second sets of fingers branch out from the inlet port. Accordingly, Gruber teaches that the inlet port (28) directly connected to the first/second sets of fingers (30). Gruber does not teach that the **inlet port directs fluid “first from” an inlet channel and then “from” the inlet channel “to” the (first/second) of one or more fingers**.

In sharp contrast, the presently-claimed invention discloses an inlet port direct fluid **from an inlet channel to** a first/second/both of one or more fingers. Further, the presently-claimed invention discloses that the first/second of one or more fingers **“branch from” the inlet channel**. As described above, Gruber teaches that the inlet port 28 directly connected to the first/second sets of fingers (30). Accordingly, Gruber does not teach an “inlet channel” between the inlet port (28) and the first/second fingers (30).

Anderson is cited as a teaching of other claim elements. Anderson does not teach the claim elements discussed above.

The independent Claim 1 is directed to a heat exchanger. The heat exchanger comprises a body having a conducting portion configured to be in contact with a heat source along a plane, wherein the conducting portion is configured to conduct heat from the heat source to a heat exchanging layer configured within the body, the body including at least one inlet port and at least one outlet port, wherein the at least one inlet port directs fluid from an inlet channel coupled

to the at least one inlet port to a first of one or more fingers, a second of one or more fingers, or both of the first and the second of one or more fingers, wherein the first of the one or more fingers branch from the inlet channel, wherein the second of the one or more fingers branch from the inlet channel, so that the fluid is able to flow from the first of the one or more fingers, the second of the one or more fingers, or both to the heat exchanging layer via an intermediate layer with a plurality of conduits which extend therethrough, wherein at least a portion of one of the first of the one or more fingers is nonparallel to a portion of at least one of the second of the one or more fingers, the heat exchanging layer includes a porous microstructure disposed thereon and is configured to distribute the fluid and to pass the distributed fluid therethrough.

As described above, neither Gruber, Anderson, nor their combination teaches at least one inlet port directs fluid from an inlet channel coupled to the at least one inlet port to a first of one or more fingers, a second of one or more fingers, or both of the first and the second of one or more fingers, wherein the first of the one or more fingers branch from the inlet channel, wherein the second of the one or more fingers branch from the inlet channel. For at least these reasons, the independent Claim 1 is allowable over the teachings of Gruber, Anderson, and their combination.

Claims 8, 10, 12-14, 17, 19, 32, 38, 40, 128-130 and 132 are dependent on independent Claim 1. Since independent Claim 1 is an allowable base claim, Claims 8, 10, 12-14, 17, 19, 32, 38, 40, 128-130 and 132 are all also allowable as being dependent upon an allowable base claim.

Within the Office Action, Claims 1, 8, 10, 12-14, 17, 19, 32, 38, 40, 128-130, and 132 are rejected under 35 U.S.C. §103(a) as obvious over the combined teachings of Gruber and Anderson and U.S. Patent No. 3,993,123 to Chu et al (hereinafter Chu) or U.S. Patent No. 5,978,220 to Frey et al (hereinafter Frey). The Applicants respectfully disagree.

As described above, neither Gruber, Anderson, nor their combination teaches “at least one inlet port directs fluid from an inlet channel coupled to the at least one inlet port to a first of one or more fingers, a second of one or more fingers, or both of the first and the second of one or more fingers, wherein the first of the one or more fingers branch from the inlet channel, wherein the second of the one or more fingers branch from the inlet channel.” Further, Chu, and Frey do not teach above claim elements. For at least these reasons, the independent Claim 1 is allowable over the teachings of Gruber, Anderson, Chu, Frey and their combination.

Claims 8, 10, 12-14, 17, 19, 32, 38, 40, 128-130 and 132 are dependent on independent Claim 1. Since independent Claim 1 is an allowable base claim, Claims 8, 10, 12-14, 17, 19, 32, 38, 40, 128-130 and 132 are all also allowable as being dependent upon an allowable base claim.

Within the Office Action, Claims 1, 8, 10, 12-14, 17, 19, 32, 38, 40, 128-130, and 132 are rejected under 35 U.S.C. §103(a) as obvious over the combined teachings of Gruber/Anderson or Gruber/Anderson/Chu/Frey as applied to claims 1, 8, 10, 12-14, 17, 19, 32, 38, 40, and 128-132 above and further in view of either U.S. Patent No. 5,983,997 to Hou et al (hereinafter Hou) or U.S. Patent No. 5,239,200 to Messina et al (hereinafter Messina). The Applicants respectfully disagree.

As described above, neither Gruber, Anderson, nor their combination teaches “at least one inlet port directs fluid from an inlet channel coupled to the at least one inlet port to a first of one or more fingers, a second of one or more fingers, or both of the first and the second of one or more fingers, wherein the first of the one or more fingers branch from the inlet channel, wherein the second of the one or more fingers branch from the inlet channel.” Further, Chu, Frey, Hou, Messina, and their combination do not teach above claim elements. For at least these reasons, the independent Claim 1 is allowable over the teachings of Gruber, Anderson, Chu, Frey, Hou, Messina, and their combination.

Claims 8, 10, 12-14, 17, 19, 32, 38, 40, 128-130 and 132 are dependent on independent Claim 1. Since independent Claim 1 is an allowable base claim, Claims 8, 10, 12-14, 17, 19, 32, 38, 40, 128-130 and 132 are all also allowable as being dependent upon an allowable base claim.

Within the Office Action, Claim 16 is rejected under 35 U.S.C. §103(a) as obvious over the combined teachings of Gruber/Anderson alone or Gruber/Anderson/Chu/Frey alone or in view of Hou or Messina as applied to claim 1 above, and further in view of U.S. Patent No. 4,758,926 to Herrell et al (hereinafter Herrell) The Applicants respectfully disagree.

As described above, the independent Claim 1 is allowable over the teachings of Gruber, Anderson, Chu, Frey, Hou, Messina, and their combination.

Claim 16 is dependent on independent Claim 1. Since independent Claim 1 is an allowable base claim, Claim 16 is also allowable as being dependent upon an allowable base claim.

Within the Office Action, Claims 29-32 are rejected under 35 U.S.C. §103(a) as obvious over the combined teachings of Gruber/Anderson alone or Gruber/Anderson/Chu/Frey alone or in view of Hou or Messina as applied to claim 1 above, and further in view of U.S. Patent No. 6,680,044 to Tonkovich et al (hereinafter Tonkovich). The Applicants respectfully disagree.

As described above, the independent Claim 1 is allowable over the teachings of Gruber, Anderson, Chu, Frey, Hou, Messina, and their combination.

Claims 29-32 are dependent on independent Claim 1. Since independent Claim 1 is an allowable base claim, Claims 29-32 are also allowable as being dependent upon an allowable base claim.

Within the Office Action, Claims 1, 8, 10, 12-14, 17, 19, 29-32, 38, 40, 128-130, and 132 are rejected under 35 U.S.C. §103(a) as obvious over the combined teachings of Gruber in view of the Jiang et al article “Thermal-Hydraulic performance of small scale micro-channel and porous-media heat exchangers (hereinafter Jiang).” The Applicants respectfully disagree.

As described above, Gruber does not teach “at least one inlet port directs fluid from an inlet channel coupled to the at least one inlet port to a first of one or more fingers, a second of one or more fingers, or both of the first and the second of one or more fingers, wherein the first of the one or more fingers branch from the inlet channel, wherein the second of the one or more fingers branch from the inlet channel.” Further Jiang does not teach above claim elements. For at least these reasons, the independent Claim 1 is allowable over the teachings of Gruber, Jiang, and their combination.

Claims 8, 10, 12-14, 17, 19, 29-32, 38, 40, 128-130, and 132 are dependent on independent Claim 1. Since independent Claim 1 is an allowable base claim, Claims 8, 10, 12-14, 17, 19, 29-32, 38, 40, 128-130, and 132 are all also allowable as being dependent upon an allowable base claim.

Within the Office Action, Claims 1, 8, 10, 12-14, 17, 19, 29-32, 38, 40, 128-130, and 132 are rejected under 35 U.S.C. §103(a) as obvious over the combined teachings of Gruber in view of the Jiang and Chu or Frey. The Applicants respectfully disagree.

As described above, Gruber does not teach “at least one inlet port directs fluid from an inlet channel coupled to the at least one inlet port to a first of one or more fingers, a second of one or more fingers, or both of the first and the second of one or more fingers, wherein the first of the one or more fingers branch from the inlet channel, wherein the second of the one or more

fingers branch from the inlet channel.” Further Jiang does not teach above claim elements. For at least these reasons, the independent Claim 1 is allowable over the teachings of Gruber, Jiang, Chu, Frey, and their combination.

Claims 8, 10, 12-14, 17, 19, 29-32, 38, 40, 128-130, and 132 are dependent on independent Claim 1. Since independent Claim 1 is an allowable base claim, Claims 8, 10, 12-14, 17, 19, 29-32, 38, 40, 128-130, and 132 are all also allowable as being dependent upon an allowable base claim.

Within the Office Action, Claims 1, 8, 10, 12-14, 17, 19, 29-32, 38, 40, 128-130, and 132 are rejected under 35 U.S.C. §103(a) as obvious over the combined teachings of Gruber in view of the US Patent No. 4,896,719 to O’Neill et al. (hereinafter, O’Neill) and Tonkovich. The Applicants respectfully disagree.

As described above, Gruber does not teach “at least one inlet port directs fluid from an inlet channel coupled to the at least one inlet port to a first of one or more fingers, a second of one or more fingers, or both of the first and the second of one or more fingers, wherein the first of the one or more fingers branch from the inlet channel, wherein the second of the one or more fingers branch from the inlet channel.” Further O’Neill and Tonkovich do not teach above claim elements. [Office Action, page 17] For at least these reasons, the independent Claim 1 is allowable over the teachings of Gruber, O’Neill, Tonkovich, and their combination.

Claims 8, 10, 12-14, 17, 19, 29-32, 38, 40, 128-130, and 132 are dependent on independent Claim 1. Since independent Claim 1 is an allowable base claim, Claims 8, 10, 12-14, 17, 19, 29-32, 38, 40, 128-130, and 132 are all also allowable as being dependent upon an allowable base claim.

Within the Office Action, Claims 1, 8, 10, 12-14, 17, 19, 29-32, 38, 40, 128-130, and 132 are rejected under 35 U.S.C. §103(a) as obvious over the combined teachings of Gruber in view of O’Neill, Tonkovich, Chu or Frey. The Applicants respectfully disagree.

As described above, Gruber does not teach “at least one inlet port directs fluid from an inlet channel coupled to the at least one inlet port to a first of one or more fingers, a second of one or more fingers, or both of the first and the second of one or more fingers, wherein the first of the one or more fingers branch from the inlet channel, wherein the second of the one or more fingers branch from the inlet channel.” Further O’Neill, Tonkovich, and Chu or Frey do not teach

above claim elements. For at least these reasons, the independent Claim 1 is allowable over the teachings of Gruber, O'Neill, Tonkovich, Chu, Frey and their combination.

Claims 8, 10, 12-14, 17, 19, 29-32, 38, 40, 128-130, and 132 are dependent on independent Claim 1. Since independent Claim 1 is an allowable base claim, Claims 8, 10, 12-14, 17, 19, 29-32, 38, 40, 128-130, and 132 are all also allowable as being dependent upon an allowable base claim.

Within the Office Action, Claims 41 and 44 are rejected under 35 U.S.C. §103(a) as obvious over any of the prior art references as applied to claim 1 above, and further in view of US Patent No. 5,918,469 to Cardella (hereinafter Cardella) or WO 01/25711 A1. The Applicants respectfully disagree.

As described above, the independent Claim 1 is allowable over the teachings of all of the prior art references as applied to claim 1 above.

Claims 41 and 44 are dependent on independent Claim 1. Since independent Claim 1 is an allowable base claim, Claims 41 and 44 are both also allowable as being dependent upon an allowable base claim.

Applicants' responses that are applicable to the prior Office Action are all herein incorporated by reference.



**Conclusion**

For the reasons given above, the Applicant respectfully submits that the claims are in a condition for allowance, and allowance at an early date would be appreciated. If the Examiner has any questions or comments, he is encouraged to call the undersigned at (408) 530-9700 so that any outstanding issues can be expeditiously resolved.

Respectfully submitted,  
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